

## REMARKS

Claims 7 and 21 stand objected to as abbreviations are used instead of chemical names.

Applicants have amended claims 7 and 21 so to read on chemical names.

Claims 2, 16 and 36 recite “heating panels” without proper antecedent basis.

Applicants have amended claims 2, 16 and 36 so to read “heating a panel”

Examiner states that, in claim 4, there is insufficient antecedent basis for “thermoplastic resin”.

Applicant refers the Examiner to “thermoplastic resin” of claim 1 (6<sup>th</sup> line of claim 1). The intervening claim 3 depends from claim 1, and has all the limitations of claim 1. Likewise, claim 4 would have all the limitations of claims 3 and 1. There is proper antecedent basis. No correction is required.

Examiner states that, in claim 5, there is insufficient antecedent basis for “thermoplastic polyurethane with pendent hydroxyl groups”.

With regards to claim 5, Applicant refers the Examiner to “thermoplastic polyurethane with pendent hydroxyl groups” of claim 3 (2<sup>nd</sup> and 3<sup>rd</sup> lines of claim 3). The intervening claims, 3 and 4, respectively depend from claims 1 and 3, and they have all the limitations of claim 1. Likewise, claim 5 would have all the limitations of claims 3, 4 and 1. There is proper antecedent basis in both claim 4 and 3, as claim 4 depends from claim 3, and claim 3 reads on the “thermoplastic polyurethane with pendent hydroxyl groups”. No correction is required.

The Examiner asserts that uretdione in claim 6 does not have proper antecedent basis in claim 5.

With regards to claim 6, claim 6 depends from 5, which as previously discussed, depends ultimately on claim 1. Claim 1 provides proper antecedent basis through the dependent claims. No correction is required.

The Examiner has issued a provisional double patenting rejection based on copending Application 10/739,361. US application 10/739,361 was filed after US application 10/723,145, claiming priority from the first filed. On February 17, 2006 a provisional terminal disclaimer was mailed for 10/739,361, and should arrive at your office about the time Applicants response to the first official action is received. Please advise Applicants if you do not receive the provisional terminal disclaimer, which is in a separate mailing.

The Applicant has amended the claims in this application making claims 1-32 and 35-39, such as such they are allowable. Claims 33 and 34 are canceled. The provisional terminal disclaimer overcomes the provisional double patenting rejection.

Claims 15-16, and 22-28 stand rejected under 35 U.S.C. 102(b) as being anticipated by Morikawa et al., US Patent 6,309,507. The Examiner cites Morikawa as teaching a polyisocyanate curing agent adhesive composition comprising a polyurethane base resin, a blocked isocyanate curing agent, and a solvent.

Applicants claim, in claim 15, an extruded mixture comprised of a thermoplastic resin, a thermoplastic polyurethane adhesive having pendant hydroxyl groups, and a latent thermally activated curing component; wherein said extruded mixture is coated onto the fabric, thereby forming a one pass heat curable extruded adhesive laminate. In contrast, Morikawa teaches an adhesive for adhering films, plywood furniture, nonwoven fabrics, etc. The Examiner's position is that the processing conditions are not germane to the final product, citing *In re Stephens*, 145 USPQ 656. The stated position of the patent office is that "an apparatus claim, or a product claim, may contain apparent process limitations does not render a claim indefinite. Assuming the subject matter of a claim is otherwise understandable, the inquiry would then turn to determining the patentable weight of the process limitations when comparing the claim to the prior art. Process steps *per se* cannot serve to limit product claims. See *In re Stephens*, 145 USPQ 656 (CCPA 1965) ("We think it well settled that the presence of process limitations in product claims, which product does not otherwise patentably distinguish over the prior art, cannot impart patentability to that product."). The relevant inquiry is how the process recitations might define structure. See,

e.g., *In re Dike*, 394 F.2d 584, 589, 157 USPQ 581, 585 (CCPA 1968).” In the instant invention, the product structure is, in part, defined by the interdependence of the processing conditions and the composition. Specifically, if the composition has a solvent, then the composition cannot be extruded (as taught by the Applicants) as a thermoplastic, and if the composition does not have a solvent then the composition cannot be gravure coated (as taught by Morikawa). Therefore, a solvent based composition is not suitable for making thick coatings, where the coating, in effect, is substantially a major portion of the laminate; and solvent based compositions can be used to form very thin coatings, for instance by laminating very smooth films together. Therefore, the process has limitations that are a consequence of the composition, and the product structure is limited by the process. Since the composition limits the process, which in turn does define structure, then the relevant inquiry is settled in Applicants’ favor, and the patentable weight of the process limitation must be considered. Furthermore, while Morikawa teaches the use of uretdiones, he does not teach that they can be used as latent thermally activated cure components. Morikawa mentions uretdiones, but only in the context that they are polyisocyanates, and they are consumed (col. 11, line 54) during preparation of the curing agent. Morikawa does not teach that uretdiones can be used as blocked isocyanates in a solventless composition that can be coated by extrusion.

With regard to claim 16, while Morikawa teaches (in col. 9, line 63 - col. 10, line 2) a variety of applications, he does not mention collapsible tanks, nor the use of a compression press nor the application of a high temperature post-cure to achieve a product.

With regards to claims 22-28, the Examiner has merely rejected the claims in the first line of this section, but provided no reasons for the rejection. Applicants provide the following reasons for their allowance.

Claim 22, currently amended, claims the extruded adhesive with the latent thermally activated curing component, where the adhesive has a cross-linking enhancer. In claims 23 – 24 the cross-linking enhancer is a compound with at least two hydroxyl groups, where the compound is selected from glycols; hydroxyalkylamide; abitol; butylene glycol; cyclohexanedimethanol; diethylene glycol; dipentaerythritol; dipropylene glycol; glycerine; hexylene glycol; hydrogenated Bisphenol A; methyl 1,2 propanediol; neopentylglycol; propylene glycol; sorbitol; triethylene glycol; trimethylolpropane; tripentaerythritol, alkoxy and hydroxyl alkoxy cellulose, simple sugars like fructose, sucrose, glucose and starches. Morikawa teaches (in col. 4, lines 22 – 44) that the hydroxyl groups are constrained to alkanol amines. He does not teach any of the compounds in cited in claim 24.

Applicants claim in claim 25 a hydrolytic stabilizer. Morikawa teaches (col. 9, lines 12-23) his invention may have “compounded therewith those additives and adjuvants which are usually used in the general adhesives. The additives and adjuvants include, for example, pigments, dyes, coupling agents, antiblocking agents, dispersion stabilizers, viscosity modifiers, leveling agents, antigelling agents, light stabilizers, antioxidants, ultraviolet absorbers, heat-resistance improvers, plasticizers, antistatic agents, reinforcing agents, catalysts, thixotropic agents, microbicides, fungicides, lubricants, inorganic and organic fillers and the like. As the compounding method, there can be used known methods such as stirring, dispersion and the like.” While, as seen from the grocery list above, the Morikawa teaches many types of additives, he does not teach a hydrolytic stabilizer. In fact, Morikawa

teaches away from a hydrolytic stabilizer, in that he teaches the use of a hydrophilic polar group in col. 2, line 47, which would be the converse of a hydrolytic stabilizer.

With regard to claim 26, Applicants' claim 26 claims masterbatches of bis(2,6-di-2-propylphenyl)carbodiimide, polycarbodiimide and epoxidized soy bean oil, and these compounds are also not taught by Morikawa.

With regard to claim 27, while Morikawa does teach the addition of additives during synthesis of urethane resins, he does not teach compounding thermoplastic resins, as claimed in claim 27.

With regard to claim 28, while Morikawa does teach the addition of additives to a solvent adhesive, he does not teach compounding an adhesive that can be extruded and as such is solventless and highly viscous.

Claims 1-14, 17-21 and 35-38 stand rejected under 35 USC 103(a) as being unpatentable over Ohya et al., US Patent 4,567,090 in view of Morikawa et al., US Patent 6,309,507. Examiner admits that while Ohya fails to teach the claimed adhesive composition, Morikawa teaches a polyisocyanate curing agent adhesive composition comprising a polyurethane base resin, a blocked isocyanate curing agent and a solvent.

With regards to claims 1, unlike Ohya, Applicants do not claim a laminate with two adhesive layers nor a heat resistant laminate film. Claim 1 is amended to explicitly claim the number of layers. The thermoplastic resin and the polyurethane adhesive melt and flow as extruded coatings, and are not heat resistant, in contrast to Ohya, who employs vinylidene chloride, and makes 7 layer laminate. A 7 layer laminate would be stiff as consequence of having so many layers, and therefore would be unsuitable for a collapsible tank. The

extrusion processing method eliminates the possibility of a solvent as taught by Morikawa, so that the language of claim 1 is implicitly solventless, and one in the art would know that the coatings are solventless. A uretdione is explicitly claimed, and while Morikawa mentions uretdiones, they only used in the context of reactive polyisocyanates, and they are consumed (col. 11, line 54) during preparation of the curing agent. Morikawa does not teach that uretdiones can be used as blocked isocyanates in a solventless composition. Morikawa teaches that his cure system cures at 40° C in just three days. A blocked isocyanate requires more heat than that to thermally activate it. Morikawa system requires no unblocking, and so actually is mischaracterized as being blocked. The latent thermally activated curing component is selected such that extrusion temperatures and dwell times are not sufficient to activate the cure. It is only when the laminate is put in a heated press does the curing component start to cross-linking the adhesive that is a thermoplastic polyurethane with pendant hydroxyl groups.

In the dependent claim 4, the thermoplastic resin is a thermoplastic polyurethane resin. Neither Ohya nor Morikawa teach a laminate with a thermoplastic polyurethane resin layer. Furthermore, in claim 2, the panels of the heat curable extruded adhesive laminate are heated to a temperature from about 260°F to about 350°F in a compression press, thereby forming collapsible tanks. The compression press fuses the panels and activates the latent cure. Neither Ohya nor Morikawa teach anything remotely similar. Neither Ohya nor Morikawa teach an adhesive having medium to a high level of crystallinity, and as a rule it is undesirable for an adhesive to have a high level of crystallinity, because when the T<sub>g</sub> is high, the adhesive is hard. Hard adhesives can be very poor adhesives, because they do not wet the substrate they are adhering. In the intended application, during the compression and heating, the layer of fabric, a layer of adhesive, and a layer of thermoplastic resin fuse into

substantially a single material that is a composite, with the cured adhesive distributed in the thermoplastic resin. The resulting material is flexible. With regard to claim 5 and the Examiner's position that crystallinity is inherent in the polyurethane taught by the prior art, and that hydroxyl groups have a medium crystallinity, the Applicants have no knowledge of this correlation. Other factors dominate. For instance, Morikawa teaches the use polyoxyalkylene ether polyols. If the polyoxyalkylene ether polyol is based on ethylene oxide, then there is a lot of crystallinity, if the polyoxyalkylene ether polyol is based on propylene oxide then there is almost no crystallinity. The two polyols have the same number of hydroxyl groups, but in the case of the propylene oxide based polyol, the methyl group prevents crystallization, while there is no methyl group to prevent crystallization of the polyethylene oxide polyol. If the Examiner is giving Official Notice, then the Examiner must state so, otherwise the Examiner is merely expressing his / her opinion, which, while be accurate for sugars and starches, is inaccurate for thermoplastic urethanes.

With regard to claims 37 and 38, the Examiner admits that the prior art does not teach the performance of seams after heating, but opines it is reasonable to expect that the claimed performance would be present in the heat resistant laminate formed by the prior art.

The Applicants contend that Examiner has reached a conclusion not supported by the referenced prior art. The prior art teaches laminates that are substantially cured upon completion of the lamination process or followed by a low temperature cure over several days. There is no second step of compression and heating, which fuses one panel of the laminate to another panel of the laminate. The second step kicks off the latent thermal cure and enables the adhesive (with the latent thermal cure) and the thermoplastic resin to melt, flow and fuse, and permitting the fabrics of the panels to move into contact - becoming substantially reinforced. Furthermore, Ohya nor Morikawa teach the use of urethanes to



bond essentially dissimilar films. For instance, in Ohya, the urethane adhesive (C) is used to bond a polyolefin adhesive layer (B) to a copolymer of vinylidene chloride layer (D). In Morikawa, the urethane adhesive is used to bond a PET layer to a aluminum foil. Morikawa teaches that the cure is at 40° C (104° F) for three days. Contrast those conditions against Applicants cure conditions of 260° F to about 350° F, while under compression, as claimed in claims 2, 16 and 36. Morikawa attains bond strengths in Table 4 of 1200 grams force /15 mm. This is about 4.4 lbs/in. Applicants attain bond strengths of 25 lbs/in, after being immersed in water and /or fuel at 160° F for six weeks. Clearly, Applicants have attained superior properties that are not taught by the prior art.

Claims 29 and 30 stand rejected under 35 USC 103(a) as being unpatentable over Ohya et al., US Patent 4,567,090 in view of Morikawa et al., US Patent 6,309,507. The Examiner admits that the specific “hydroxyalkylamide” is not taught, but asserts that it would be obvious based on its suitability.

Applicants could not find the reference to hydroxyalkylamide in Morikawa, let alone the reference to N,N,N',N'-tetrakis(2-hydroxyethyl)adipamide, or N,N,N',N'-tetrakis(2-hydroxypropyl)adipamide. Also, Applicants noticed that Examiner misspelled hydroxyalkylamide, as well as did the Applicants in claims 29 and 30, and perhaps this led to the incorrect conclusion. The claims have been amended to correct the spelling.

Claims 31 and 32 stand rejected under 35 USC 103(a). The Examiner admits that the specific “hydroxyalkylamide” is not taught, but asserts that it would be obvious based on its suitability.

Applicants have amended claims 31 and 32 to correct the spelling of hydroxyalkylamide. Examiner will note, that the base material is an amide, not an amine as taught by Morikawa. The specific amides claimed in claim 32 are N,N,N',N'-tetrakis(2-hydroxyethyl)adipamide, or N,N,N',N'-tetrakis(2-hydroxypropyl)adipamide, and Morikawa does not read on any tetra functional cross-link enhancer. The rejections of claims 29 – 32 are respectfully traversed.

Claim 26 stands rejected under 35 USC 103(a) as being unpatentable over Morikawa et al., US Patent 6,309,507 and further in view of JP 406192206A.

Applicant's have amended claim 26, so that it now reads on masterbatches of bis(2,6-di-2-propylphenyl)carbodiimide, polycarbodiimide and epoxidized soy bean oil. Support for the amendment can be found in the specification on page 8, line 5. JP 406192206A reads on bis(2,6-di-2-propylphenyl)carbodiimide, but does not read on masterbatches of the same, where a masterbatch is much easier to admix with extruded materials, where the viscosity is very high, and mixing is difficult.

Claim 33 stands rejected under 35 USC 103(a) as being unpatentable over Ohya et al., US Patent 4,567,090 in view of Morikawa et al., US Patent 6,309,507.

Applicants claim 33 is canceled.

Claim 39 stands rejected under 35 USC 102(b) as being anticipated by Morikawa et al., US Patent 6,309,507.

Applicant's claim 39 depends from claim 16, which reads on a process step wherein panels of the laminate are fused and cured under pressure and relatively high temperatures, therein forming a collapsible tank with seams. Morikawa attains maximum seam strengths (see Table 4) of 4.4 lbs/ after curing at 40° C (104° F) for three days. Morikawa requires no thermal activation. There is no second step of compression and heating, which fuses one panel of a laminate to another panel of the laminate. The process as claimed in claim 16 kicks off the latent thermal cure and enables the adhesive (with the latent thermal cure) and the thermoplastic resin to melt, flow and fuse - becoming substantially one reinforced material. Applicants cure conditions are 260° F to about 350° F, while under compression. Applicants attain bond strengths of 25 lbs/in, after being immersed in water and /or fuel at 160° F for six weeks. Clearly, Applicants have attained superior properties that are not taught by the prior art, and there is no comparable material taught by Morikawa. The difference in final strengths attained further highlights the differences in structure between Applicants invention and Morikawa's invention.

The are no new claims or fees.

In view of the foregoing amendment and these remarks, this application is now believed to be in condition for allowance and such favorable action is respectfully requested on behalf of the Applicant.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "F. Rhett Brockington", with a stylized flourish at the end.

F. Rhett Brockington  
Patent Agent for Applicants  
Registration No. 29,618  
DOUGHERTY, CLEMENTS & HOFER  
1901 Roxborough Road, Suite 300  
Charlotte, North Carolina 28211  
Telephone: 704/366-6642  
Facsimile: 704/366-9744

FRB/bcb  
Attorney's Docket 3876